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KNOW YOUR NATIONAL FORESTS

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KNOW YOUR NATIONAL FORESTS

A STORY OF CONSERVATION THROUGH WISE USE

by

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PREPARED FOR USE IN CALIFORNIA

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FOREWORD

This booklet explains the purposes and uses of the national forests of California, in non-technical language. The concept of conservation as wise use is stressed.

Women's clubs, parent-teacher groups and others will find the booklet useful for meetings or panel discussions on conservation.

In schools the material can be used as a supplement to related work in natural science, general science, biology or civics, or as a separate unit. It may be of value for assignment as an independent study to faster-working pupils. Two weeks should be an adequate time allowance. Problems have been grouped at convenient points. The key words which accompany the problems should be defined and understood. The Code of Outdoor Good Manners, given on page 32 provides a simple, workable formula for practicing conservation. The Review on page 38 offers suggestions for a convenient summary and test. Teaching aids are given in the Appendix.

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INTRODUCING OUR NATIONAL FORESTS

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We have a feeling for this heritage of ours—for our forests, for our mountains. We like to hear the rush of mountain streams, and to feel the cool shade of the forest on a hot day. We like to smell pine needles fragrant under the sun, and we like to see the trees of the forest covering the hillsides with green. We know that forests are not only useful, but necessary to our daily living: they provide homes for wild animals and birds and fish; they make life comfortable by furnishing lumber for homes; they provide forage for sheep and cattle to eat; they give us water for our daily living. We know that forests are fun: that we can hike and camp and picnic in the woods.

In this booklet, we are going to learn about the uses of the forest. We are going to learn about the national forests of California in particular and what they do for our people. Most persons agree that "conservation" is good. But fewer people really know what it means, what we must conserve, or how to go about it. So we will learn the meaning of conservation and what we can do to practice it.

We may as well begin by laying a ghost which confuses the minds of many people—including conservationists—by distinguishing between the various types of public forests and parks in California. How many people notice the signs which name the agency administering such areas?

National parks and monuments are administered by the National Park Service of the U. S. Department of the Interior. They are areas of scenic, historical, or scientific interest set aside for the enjoyment of the people. They are usually left in a natural condition except for necessary tourist accommodations. Such activities as timber cutting and grazing are not permitted.

NATIONAL PARKS AND MONUMENTS IN CALIFORNIA

Parks	Monuments	
Yosemite	Lava Beds	Channel Islands
Kings Canyon	Muir Woods	Cabrillo
Sequoia	Devil Postpile	Joshua Tree
Lassen Volcanic	Death Valley	Pinnacles

State parks, beaches, and historic monuments are administered by the Division of Beaches and Parks of the California Department of Natural Resources. There are about 88 of them—sandy beaches, rocky coastlines, lakes and lagoons, mountains, deserts, and timber areas, including groves of redwoods.

STATE PARKS, BEACHES AND HISTORIC MONUMENTS

Parks	Beaches	Historic Monuments
McArthur-Burney Falls	Santa Monica	Donner
Humboldt Redwood	Manhattan	Marshall
Mount Tamalpais	Alamitos	Fort Ross
Big Basin	Doheny	Fort Tejon
Point Lobos	Sunset	San Juan Bautista
Anza Desert	Carpinteria	Monterey
Mount San Jacinto	Van Damme	Sonoma Mission

AND MANY OTHERS

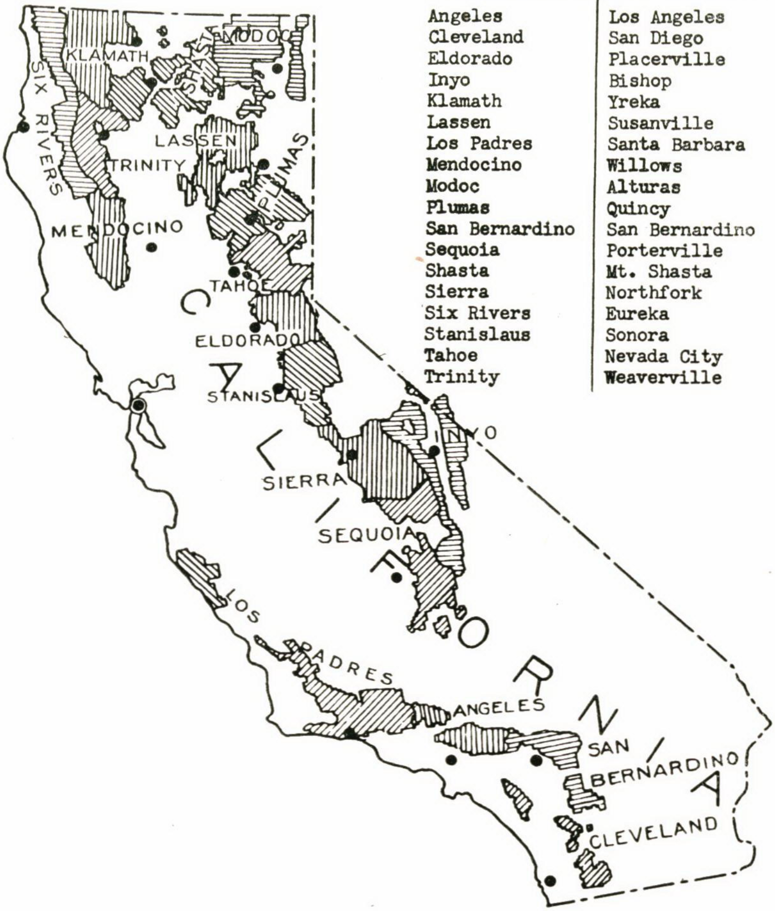
State forests are administered by the Division of Forestry of the California Department of Natural Resources. There are three of them, totaling about 60,000 acres. The Division of Forestry also protects from fire about 24 million acres of privately-owned lands covered with forest and brush. These lie outside the national forests and national parks.

This booklet deals chiefly with *national forests*. National forests are administered by the Forest Service of the U. S. Department of Agriculture, under a policy of *multiple use*. Multiple use means that it is possible for timber to be cut, cattle to be grazed, and recreation to be enjoyed, all in the same area. For example, a mountain meadow may provide grass for cattle; a location for a boys' or girls' camp; a stream for fishing, swimming, irrigation, or electric power; and the surrounding timber may be cut, with care, for lumber. The purpose is to have each acre of national forest land contribute the greatest good to the greatest number in the long run, whatever that good may be.

A national forest contains about one million acres under the administration of a forest supervisor. There are 18 national forests in California. Each is divided into about five ranger districts. A district is administered by a district forest ranger.

THE NATIONAL FORESTS OF THE CALIFORNIA REGION, SHOWING LOCATION OF FOREST SUPERVISORS' OFFICES

National Forest	Headquarters
Angeles	Los Angeles
Cleveland	San Diego
Eldorado	Placerville
Inyo	Bishop
Klamath	Yreka
Lassen	Susanville
Los Padres	Santa Barbara
Mendocino	Willows
Modoc	Alturas
Plumas	Quincy
San Bernardino	San Bernardino
Sequoia	Porterville
Shasta	Mt. Shasta
Sierra	Northfork
Six Rivers	Eureka
Stanislaus	Sonora
Tahoe	Nevada City
Trinity	Weaverville


KLAMATH
MODOC
SHASTA
SIX RIVERS
LASSEN
TRINITY
PLUMAS
MENDOCINO
TAHOE
ELDORADO
STANISLAUS
INYO
SIERRA
SEQUOIA
LOS PADRES
ANGELES
SAN BERNARDINO
CLEVELAND
CALIFORNIA

Dots on the map show location of headquarters. San Francisco is headquarters for the California Region.

Examine the map on page 41 in the Appendix. It shows that most of the national forest land is in the West—in the Rocky Mountain and Pacific Coast States. There are about 178 million acres in our national forests, an area 1¾ times the size of California. For convenience in administration, the country has been divided into nine national forest regions of which California is one.

California has an area of about 100 million acres, of which nearly 20 million acres are in national forests—nearly one acre in every five.

On page 44 of the Appendix there is a chart showing the purposes and organization of the various agencies which administer public forests and parks.

FORESTS ARE FUN

Recreation is one of the most important "industries" in California. Along the seacoast, in the redwoods, in the mountains, in the desert, we find resorts and playgrounds. California is one of the greatest recreation centers in the Nation and many of these recreation spots are overcrowded. How to provide for the recreation needs of the large population within the State, and of millions of out-of-State visitors presents a problem in planning. The California Recreation Commission, created in 1947, will attempt to help solve this problem.

The 18 national forests of California are visited by more than four million people each year, who come to the mountains to fish, hunt, swim, ride, hike, and camp out.

F-418769

Skiing brings thousands of visitors to the forests in winter and makes them year-round playgrounds. There are 50 popular winter-sports areas within the national forests.

Well-known National Forest Recreation and Scenic Centers in California

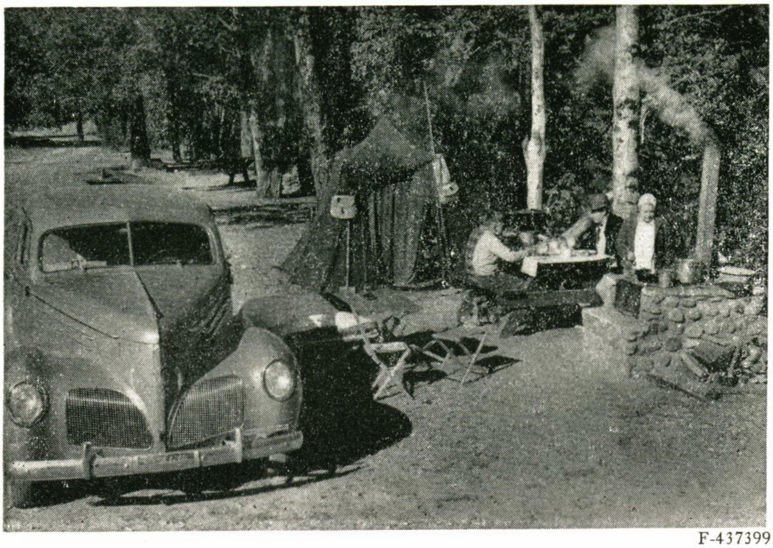
- Klamath River
- Mount Shasta
- Salmon-Trinity Alps
- Yolla-Bolly Mts.
- Lake Almanor
- Feather River
- Lakes Basin
- Lake Tahoe region
- Pinecrest
- Silver Lake
- Bass Lake
- Huntington Lake
- Kern River
- Mammoth Lakes region
- Mount Whitney
- Santa-Ynez River
- Mount Pinos
- Angeles Crest Highway
- Mt. Wilson Observatory
- Big Pines
- Crystal Lake
- Lake Arrowhead
- Big Bear Lake
- Rim-of-the-World Drive
- Palomar Observatory
- Laguna Mt. area

Each year over 16 million people drive through the national forests of the State on business or to enjoy the scenery. To picture this, imagine a single line of cars stretching from New York to the Pacific Coast!

Portions of certain national forests, called *wilderness areas,* have been preserved in a wild condition for the enjoyment of people who want to live close to nature. No construction of roads, summer homes, or resorts is allowed. These are areas of rough mountains and forests, rich in scenic beauty, distant from roads, where people can hike, take pack trips, fish, and camp out in tents. But only a small part of the national forests, about 1½ million acres in California, or 8 per cent, has been set aside for this purpose. Locations are shown in the table on page 45 in the Appendix.

Sixteen of the national forests of California—all except the Tahoe and the Plumas—have at least one wilderness area.

On most of the 92 per cent of national forest land not set aside in wilderness areas, continuous crops of timber are grown and harvested, cattle and sheep are grazed, roads are built, and recreation developed. Recreational resources are developed for the fullest use of the general public and not for the exclusive use of individuals or small groups.



F-437399

The Forest Service has constructed over 10,000 family camp or picnic units in California such as the one shown in the above photograph. Each unit consists of stove, table, car parking space, and a place for a tent.

There are roads, water supplies, and sanitation conveniences at all improved campgrounds. No charge is made for their use.

Youth camps, municipal recreation camps, summer homes, and resorts are permitted in areas especially planned for that purpose. There is a small rental for such uses. Simple design, quiet colors, and rustic appearance are favored.

In the four national forests of southern California, camping or picnicking outside improved and posted campgrounds is prohibited because of fire hazard. In the other forests it is allowed, but there are a few exceptions. In periods of high fire danger, parts or all of the national forests may be posted or closed to public use and travel except under special permit. Smoking is prohibited except in camp, at places of habitation, and in special posted areas. The local forest ranger provides rules for camping and fire prevention.

KEY WORDS

National forest
Multiple-use policy of land management
Wilderness areas

PROBLEMS

1. Examine the map on page 4. What is the name of the National Forest nearest your home, and where is its headquarters?
2. What other National Forests are important to your community? In what ways?
3. How are wilderness areas different from other areas of national forest land?
4. Examine the map on page 41 of the Appendix. What six States have large areas of national forest land? Name six States which have no national forests.
5. What are the differences between national forests and national parks?

FORESTS PROVIDE A HOME FOR FISH, BIRDS AND WILD ANIMALS

Many of the four million people who visit the national forests of California each year are attracted because of the opportunities for fishing and hunting.

F-437404

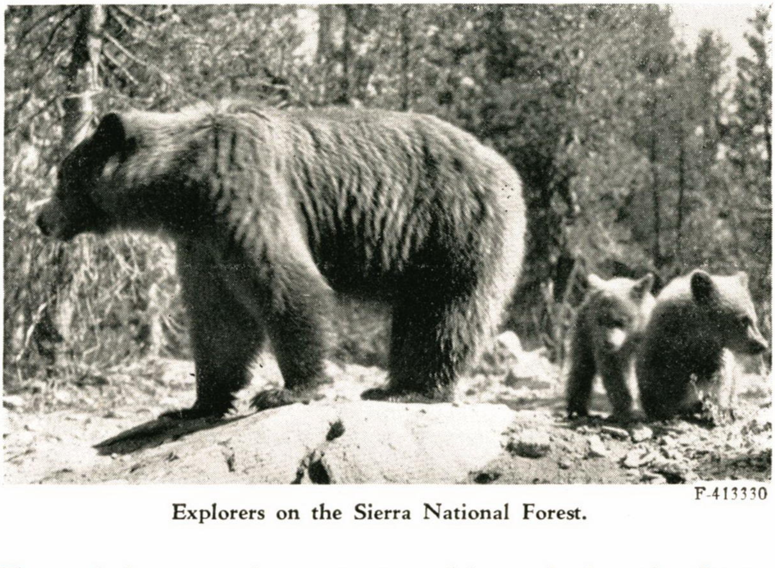
Most of the trout streams and lakes of the State are located within national forests.

KINDS OF FISH
IN NATIONAL FOREST WATERS

Trout	Rainbow Brook Golden Lochleven Cutthroat Steelhead
Salmon	

On some national forests, small rearing-ponds are located on streams. Here tiny fish from a hatchery are allowed to grow during the summer and are released into the creek in the fall when they are large enough to live in fast water. Forest rangers also assist in planting trout from State or Federal hatcheries. These fish are usually transported to the point of release on trucks in cans or special aerated tanks.

The rules and regulations concerning hunting and fishing on national forests are made and enforced by the Division of Fish and Game, State Department of Natural Resources. This division also determines the fees that will be charged for this privilege. But both the State and Forest Service work together in deciding what needs to be done to help produce good "crops" of fish, birds, and wild animals. This includes improving their environment, or habitat, which provides food, shelter, and protection against natural enemies.



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Explorers on the Sierra National Forest.

Two of the more important problems facing the State and the Forest Service are: how to furnish satisfactory hunting and fishing to increasing numbers of sportsmen without reducing limits or seasons too severely; and how to provide enough range all year long for the big game herds.

CENSUS ESTIMATES OF WILD ANIMALS IN NATIONAL FORESTS OF CALIFORNIA

Deer	422,000	Bears	16,000
Mountain sheep	500	Antelopes	2,700
Elk	120	Coyotes	88,000
Bobcats	37,000	Mountain lions	1,200

KINDS OF FUR-BEARING ANIMALS IN NATIONAL FORESTS

Fox	Beaver	Marten
Mink	Rabbit	Skunk
Badger	Weasel	Fisher
Wolverine	Muskrat	Ringtailed cat
Otter	Opossum	Raccoon

In nearly all of their protection work the State game wardens are assisted by forest rangers, who usually are appointed as deputy game wardens also. Law enforcement, however, is not the principal job of the Forest Service in wildlife management. The forest ranger's part is to manage the forest land in his district to provide food, shelter, and good living conditions (a good habitat) for birds, fish, and animals. Because certain kinds of plants are especially good for these purposes, he may start them growing. The ranger manages the forest for wildlife production, as well as for the grazing of livestock, timber cutting, and recreation. If national forests had to be managed for one crop alone such as timber or wildlife, the job would be much easier!

Sometimes refuges, sanctuaries, or special protected areas are set aside where the mammals or birds can be allowed to increase, when numbers become too low. The Sisquoc Condor Sanctuary on Los Padre National Forest is a good example. This area was set aside to help the California condor in its fight for existence.

GAME BIRDS IN NATIONAL FORESTS

Ducks Pheasants Geese	Quail Doves

KEY WORDS

Improving the habitat
Refuges and sanctuaries

PROBLEMS

(Answers are not in the text.)

1. How will the quail population be affected if brush is burned off a large area?

2. If large areas are logged destructively, cutting all the large trees and breaking many of the very small ones, how will deer living in the forest be affected?

3. What is the effect on fish of dumping mining or factory waste into streams? How does a forest fire along a stream affect the fishing?

4. Why isn't stocking with young fish or game birds by itself a satisfactory method of improving fishing or hunting? What else should be done?

5. Some people say burning off the trees and brush makes good deer hunting because you can see the animals better. Do you think burning is good management? Why?

FORESTS FURNISH PASTURE FOR LIVESTOCK

Approximately 126,000 cattle, 133,000 sheep, and a few horses and goats are permitted each year to obtain forage (feed) from the national forests of California. A charge is made for this grazing.

F-235231

Cattle harvest the forage crop on meadows and in the open forests of the foothills.

Grazing should begin in the spring only after the forage plants have a good start in growth. Continued too-early grazing makes the plants weaker each year until they finally die out. Too many animals on the range will cause similar damage. When the grass is killed, worthless weeds and bare ground take its place.

F-220453

Sheep graze at higher elevations, often above timberline.

Without a plant cover to hold the *topsoil* in place it may be washed off or blown away. Such loss of soil is called *erosion*. The *sub-soil* (under-soil) is less fertile and less productive. The only plants that will grow on it are usually worthless weeds.

If range is damaged by loss of topsoil, some, or perhaps all, of the stock may have to be removed because of lack of feed. To keep the soil productive, the range must be used wisely. That means keeping off stock in the spring until plant growth is well started, and stocking with cattle or sheep in numbers which will permit the plants to keep their strength and vigor after cropping.

About half of the plant growth must be left uneaten at the end of the year if the range is to remain in good condition. When range is damaged, forage plants become small and weak and scattered. On good range, the same kinds of plants grow large and strong and close together. On damaged range there is usually considerable bare ground, with small stones and pebbles visible, showing that the fine topsoil has been washed away or eroded.

In the valleys and mountains of California, brush and dry grass on cattle and sheep range are often set afire and burned off. Some people think this makes better grazing. Actually it results in the poorer grasses—those with low food value—replacing better grasses. Plants undesirable on the range usually prefer "raw" soil—soil that has been burned over or exposed by loss of topsoil.

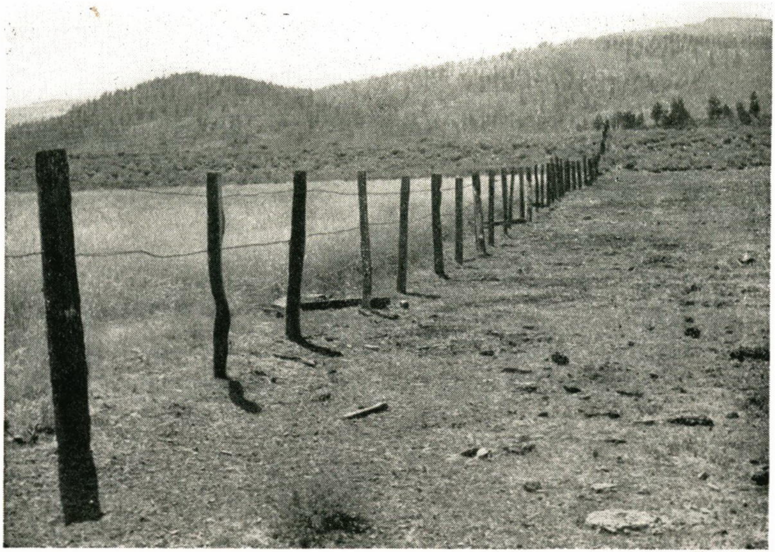
Good plants are good soil-builders. Through action of their roots, and with what fertilizer they add when they decay, they improve the soil. Burning destroys the nutritious elements in the topsoil. The poorer plants which come in after fire, or with overgrazing, take more out of the soil than they put back. Burning range land or feeding too many head of stock on it lays the soil bare to the sun and to the rain. The soil then dries out, and may be washed away because there is not a good cover of plants to hold it.

RULES FOR WISE USE OF RANGE

Don't overcrowd.
Don't allow livestock to use
range too early, or too long.
Don't burn the range.

Forest rangers work with stockmen to see that national forest ranges are used in ways which will provide plenty of forage. Livestock on mountain ranges cannot be turned loose to go where they wish when they wish.

Cattle are taken care of by riders (cowboys), and sheep are watched over by herders. These men keep the stock within their allotted area and seek to obtain best use of the feed. Good range management means *using forage wisely*.



F-307193

In the above photograph, there is excellent range on one side of the fence and poor range on the other. The overgrazed range is like a sick person and needs treatment. It may be necessary to keep off some, or all, of the livestock for several years. Or a later start for spring grazing may do the trick. Then if the range does not improve naturally, reseeding with grasses may be necessary.

KEY WORDS

Topsoil
Forage
Erosion
Range management

PROBLEMS

1. What are the signs that show a pasture has been used too heavily?
2. See if you can figure out why reseeding alone, without reducing numbers or shortening the grazing season is not the complete cure for injured range? (This is similar to question 4, page 13.)
3. What are some of the things to be done if you are trying to use range wisely?

FORESTS PRODUCE TIMBER

In the United States, there are almost 2 billion acres of land. About 461 million acres of this are commercial forest land—land capable of growing timber in good quantity and quality if used wisely. Another 163 million acres are non-commercial forest land, an example being the chaparral land in southern California. There the chief value of the trees and other plants is to protect watersheds. Adding 461 and 163 million acres together, we find that almost one-third of the total land area of the United States is forest.

The area of California is approximately 100 million acres. About 16 million acres are private and government land where timber can be grown for commercial use. So about one-sixth of the area of the State is forest land.

National Forests are important timber-producing areas.

AMOUNT OF STANDING TIMBER IN THE NATIONAL FORESTS OF CALIFORNIA

Kind (species)		Billion Board Feet
Ponderosa pine		25
Fir		20
Douglas-fir		16
Sugar pine		10
Incense-cedar		3
Redwood		1
	Total	75

Thus, the timber now growing in the national forests of California is sufficient to build houses for about 30 million people, or three times the present population.

In the United States as a whole, about 275 board feet of lumber are used yearly per person, but in California each of us uses about 560 board feet per year. (A *board foot* is the amount of lumber in a board one foot long, one foot wide, and one inch thick.) Why do Californians use twice as much lumber as the average person in the rest of the country? The explanation is two-fold: (1) There is a growing population and growing business. New homes, new factories, new stores, require lumber; even construction with concrete requires "forms" of wood into which the concrete is poured. (2) A great amount of lumber is required for the crates and boxes in which the vegetable and fruit crops are packed.

F-437802

A log pond and sawmill in northern California.

California produces only about two-thirds as much lumber as it uses. Lumber is shipped in from Washington, Oregon, and the Southern States to supply the demand for certain kinds of lumber. On the other hand, about one-third of California's lumber production of other kinds is shipped to the East.

Forest lands of California are supplying timber for the great expansion of population and business at a rate faster than ever, as the following table shows:

YEAR	STATE PRODUCTION (million board feet)
1946	2,680
1945	2,260
1944	2,470
1932	680
1926	2,190

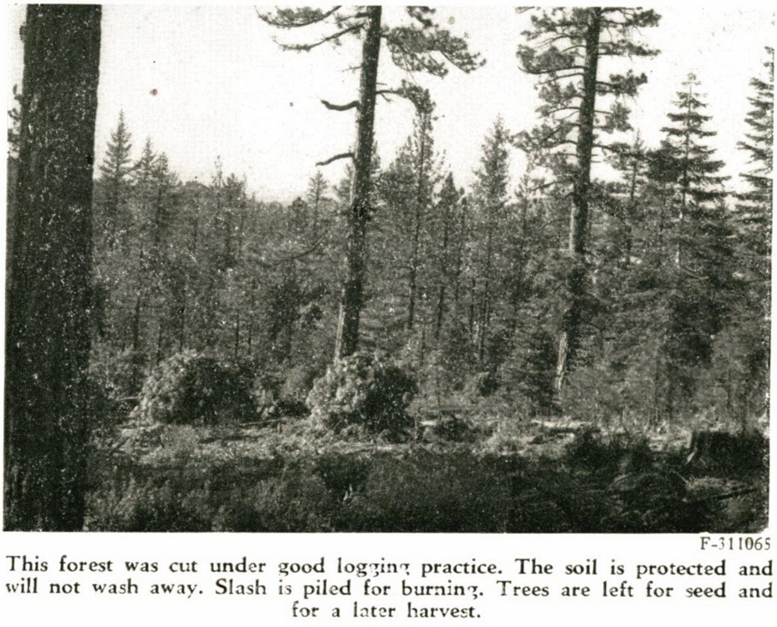
National forests furnish about one-fifth of the total production. The Lassen and Plumas National Forests are well in the lead over other forests in sales of timber to lumbermen. Find these forests on the map on page 4. The four southern California forests sell practically no timber, since they are mostly covered with shrubby growth (chaparral). They are chiefly valuable for watershed protection, flood control, and recreation. (A *watershed* is an area where rain falls or snow melts to supply water for a stream or lake.) All other California forests produce some timber. The heaviest production is in the northern Sierra Nevada. There is lighter production in the southern Sierra Nevada, and still less in the national forests of northwestern California. Relative amounts of standing timber in each county are shown on the map on page 43 of the Appendix.

F-437876

Marking a tree to be cut, using a paint-gun. This is a first step in good forestry practice.

In California it takes about 100 years for a tree to grow to saw-timber size. (*Saw-timber* means timber which is sawed in manufacture; for example, timber sawed into lumber. Timber not sawed may be sold "in the round," like fence posts, or split out, like grape stakes.) If everything is cut off the land at once, we must wait about 100 years until a complete new forest grows before we can again cut timber on the same area. However, if healthy young trees are left in the first cutting, they will reach saw-timber size in less than 100 years, and another profitable cutting can be made.

It is important to leave the young fast-growing trees. Through wise use we can harvest a timber crop from an area over and over again. We harvest a vegetable or fruit or grass crop each year; with trees, the crop can be harvested perhaps once every 25 years. If we keep



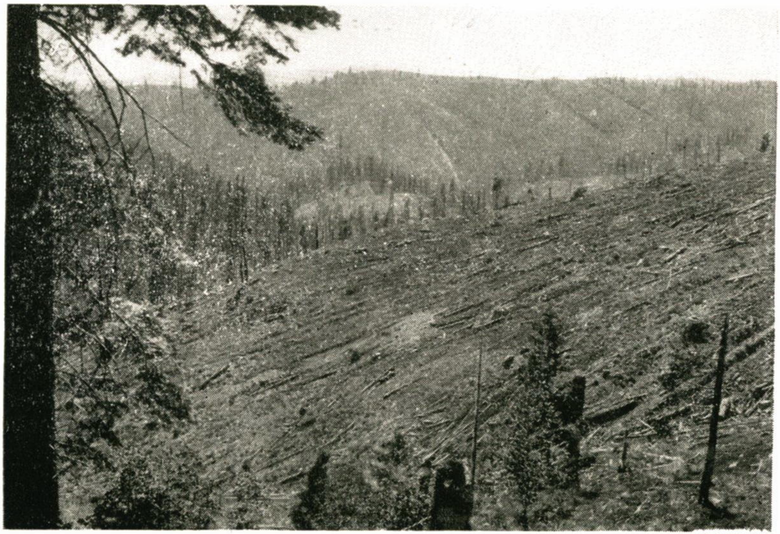
F-311065

This forest was cut under good logging practice. The soil is protected and will not wash away. Slash is piled for burning. Trees are left for seed and for a later harvest.

fire out and provide for seed and young trees, we can continue producing timber crops from a piece of land year after year.

Many communities depend upon logging or sawmills for their existence. As long as the timber holds out, these towns will continue to prosper. Men will work in the woods or in the mill, and raise families in prosperity. There will be churches, and stores, and banks, and schools, and homes. In any forest large enough to support a community, the cutting of timber can go on forever if it is planned properly. That is called *sustained-yield cutting*.

Unfortunately, timber land is not always treated in this way. Trees are often cut without selecting some to be saved, or they are cut high on the stump, wasting the best lumber. Young trees may be broken off because of



F-237458

This forest was cut under bad logging practice. There are no trees left for seed or for the next cut. The soil is left unprotected. Wildlife and watershed values have been destroyed.

carelessness in felling large trees, and other young growth ruined when logs are carelessly taken out of the woods with tractors or drag-lines. Tops and branches are not always piled and burned. Forest fires are allowed to start and to spread. They sweep through the area, completing the damage.

What happens to a community when the timber is gone? The logging camps and the sawmill move out, the people leave, and the town for all practical purposes is dead. Did you ever see a "ghost town"—one left after logging or mining had closed down? If you have, you know the feeling of death to a community.

Natural resources like forests and grass and fish and game which "keep growing" do not have to be locked up to conserve them. But—they do have to be used wisely.

KEY WORDS

Marking timber
Timber crop
Sustained-yield cutting

PROBLEMS

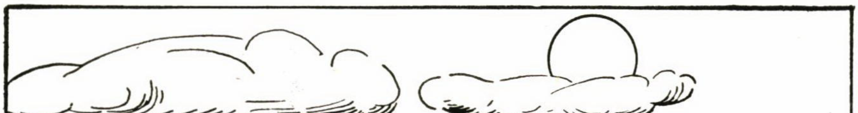
1. How may timber be treated like a crop?
2. Name 5 good forestry practices. (Example: Select certain trees to be saved.)
3. Name 5 indications of bad logging practice. (Example: No plan for leaving certain trees.)
4. What species of timber grows in California in the largest amount? How does it compare with the amount of standing redwood timber?

5. Examine the map on page 43 of the Appendix. What 6 counties seem to have the largest area of timber cropland?

6. What is the difference between *commercial* and *non-commercial* forest land? In what part of California is most of the forest land non-commercial? What are its chief values?

FORESTS ARE WATERSHEDS

Forest lands act as storehouses for water. Of course, water is used in many ways—for drinking and bathing; for washing clothes and dishes; for navigation; for recreation; for irrigation; in factories; and for generating electricity.


PRECIPITATION
RAIN
HAIL
OR
SNOW
EVAPORATION
TRANSPIRATION
LAKE
RUNOFF
WATER ENTERS AND MOVES DOWNWARD IN SOIL
Spring
GROUND WATER
OCEAN
HUMUS AND LITTER
TOPSOIL
SUB SOIL
PARENT SOIL MATERIAL
ROCK

Water travels from clouds to earth and back to clouds.

Water is the most important resource of the forests of California. The moist winds from the Pacific Ocean blow inland and are cooled when they meet the mountains. The moisture condenses when it is cooled, and falls as rain or snow. For this reason, forest areas in the mountains receive more moisture than the dry central valleys. The snow which falls in the High Sierra is important because it melts in the spring to furnish

F-376787

A source of water for farms and cities in the valleys below.

water for many communities and farms. The great snow-fields of the Sierra Nevada receive as much as 600 inches of snowfall in a winter, which settles or "packs" to around 250 inches in some places.

The forests of the Sierra Nevada watersheds provide a water supply for:

- Hetch Hetchy Reservoir—which supplies San Francisco and some peninsula cities.
- Pardee Reservoir—which supplies Oakland and other East Bay cities.
- Owens River reservoirs—which supply part of the water for Los Angeles.
- Central Valley Project reservoirs—which supply water for irrigating the San Joaquin and Sacramento Valleys.
- Many local reservoirs.
- Underground water for pumping.

Other important watershed areas in California are the forests of the Coast Range and those of southern California in the vicinity of Los Angeles, San Bernardino, and San Diego.

The national forests of Colorado, Utah, and Wyoming are part of the Colorado River watershed, from which cities belonging to the Southern California Metropolitan Water District obtain their water, as well as the Imperial and Coachella Valleys.

It is important to know how much snow falls in the forests because so much depends upon snow as a source of water. Measurements of snow are made at many strategic points in California through the winter and spring.

Sometimes forest rangers help take these measurements, under the direction of the State Division of Water Resources. They travel to snow-fields, usually on skis, and plunge a metal tube through the snow to solid ground. The weight of the snow in the tube gives the percentage of water in the snow. Irrigation districts, farmers, and other water users are interested in reports of the "snow harvest."

KEY WORDS

Watershed
Reservoirs
"Snow harvest"

PROBLEMS

1. Examine the map of national forests on page 4 and name the forests of the Sierra Nevada supplying water for the Central Valley Project, which will irrigate agricultural croplands from Redding to Bakersfield.

2. Determine the source of water used in your community. Find out what reservoirs, mountains, and forests are part of your water system. Learn how your community obtains, distributes, and purifies its water. Then write a short report entitled "Forest to Faucet."

3. Find out how sewage and factory waste from your community is disposed of. Do you consider the method satisfactory? Why?

PROTECTING THE FOREST

Fire, disease and insects damage our forests. A disease known as *blister rust* attacks the "white" or five-needle pines, of which California sugar pine is one. Control of this disease has been under way for many years. It is accomplished by removing currant and gooseberry bushes upon which the disease lives before it reaches the pines. Insects sometimes break out in epidemics which sweep across forests. However, there is great year-after-year loss from less violent attacks of both insects and disease, probably exceeding the loss by fire, although less spectacular.

Fire is still a great destroyer. From 1825, when the Miramichi fire swept over 3 million acres of Maine and New Brunswick to the fires in Maine in 1947, the history of the country has been studded with great conflagrations. But far more costly have been the year-after-year losses from thousands of smaller fires.

Over 20 million acres are burned every year in the United States. If all this acreage were in California the whole State would be burned over in five years. This is a staggering waste for today, and for tomorrow, too.
There are about 7500 fires each year in California. They burn over 300,000 acres of timber, brush and range. *That is the equivalent of a strip one mile wide extending from San Francisco to Los Angeles.*

An amazing fact about these fires is that only two out of every ten in California are due to natural causes, chiefly lightning. Eight out of ten are caused by people. Two of the eight are intentionally set and the other six are due to carelessness or ignorance.

The Score

MAN	NATURAL CAUSES

There can be no real forest conservation while such losses from fire are occurring. Losses must be reduced so that proper growth and development of our forests can take place. The battle will be won only when everyone understands that he has a part to play in protecting our forests.

F-342637

One man caused this fire: he tossed away a burning cigarette.

Every weapon we can bring to bear must be used. School children must work. Parents must work. Organizations for boys and girls, in groups wherever children gather, in the country, or in town, must work. We can work with colleges, with Parent-Teacher organizations, with women's groups, with service clubs. We can support such national efforts as the Cooperative Fire Prevention Campaign and National Fire Prevention Week, to see that fire prevention material is distributed. We must know the few simple rules.

We can see that the rules are learned. We can set a personal example and see that our friends abide by the rules.

THE FIRE PREVENTION RULES

1. Crush out cigarettes, cigars, pipe ashes — play safe.
2. Break your match in two. When you can hold the burned end between your fingers, you know no fire is left.
3. Drown your campfire; then stir the coals and drown it again.
4. Use ash trays in cars.

The rules are simple. Let's learn them and practice them.

Throughout this booklet we have emphasized wise use of our natural resources. Perhaps a good, brief definition for conservation is simply *wise use*. That means use for the greatest good to the greatest number in the long run. It means treating our resources so that they will continue to be productive—forever.

Even people who do not have land to manage can practice conservation when they visit the outdoors.

THE CODE OF OUTDOOR GOOD MANNERS

I will—

—drive carefully on streets and highways.
—refrain from defacing trees and signs.
—clean up papers and rubbish.
—keep streams and lakes pure.
—be a good sportsman and observe the laws.
—use care with matches, smoking materials and campfires—and make sure they are dead out.
I Will Keep Our Forests Green!

Will you pledge yourself to accept this Code?

KEY WORDS

Insect damage
Blister rust disease
Prevention of man-caused fires
Conservation

PROBLEMS

1. Give four rules for preventing forest fires.
2. Think back over what you have learned in this booklet. Then name some of the important things our country loses when the forest burns.
3. Repeat the Code of Outdoor Good Manners.

FORESTS HELP PREVENT FLOODS AND WATER SHORTAGES

How does forested land store water? The forest soil is a natural reservoir. On the surface is litter—dead leaves, twigs, and other plant parts. Beneath is litter in the process of decay. Next comes the topsoil, a mineral layer often mixed with organic (plant and animal) matter. The fresh and decaying litter on the surface of the soil, together with the organic matter in the topsoil, is called *humus*. The topsoil is dark-colored, light in weight, loose, and porous. The soil layers beneath are usually heavier and more compact, with less air space between particles.

The soil surface is protected by the mat of litter, and this in turn is protected against drying out or blowing away by the trees, shrubs, weeds, and other plants which grow in the forest.

F-399805

When rain falls on soil without plant cover, it washes the soil away.

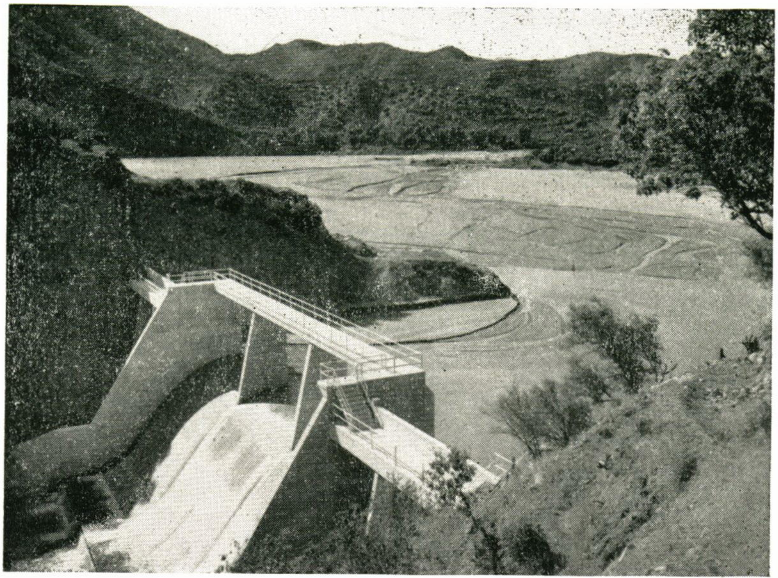
On a good forest soil, the water from rain or melting snow seeps in gently through the litter mat. Then it slowly works its way down through the soil pores, and along root channels and through insect and animal tunnels. When the soil has absorbed all the water it can hold, the surplus slowly seeps to the underground rock, which is porous enough to hold considerable water. Then it finds its way to springs and creeks. This action is like "filtering" and is known as *infiltration*. For this reason, streams with a good forest cover on their watersheds do not often have bad floods or serious water shortages. Such streams flow clear even after heavy rains or rapid snow-melt.

When rain falls on damaged or unprotected forest soil, it does not readily sink into the ground. The raindrops fall directly on the bare or packed-down soil. They splash the soil particles about. These in turn fill up the pores of the soil at the surface, preventing the water from soaking in. It has to run off on top, carrying soil with it. Such fast-moving muddy water, called surface run-off, may be very destructive. It is largely responsible for quick flood rises, and may carry large quantities of soil, gravel, and boulders torn from the hillsides or from stream banks.

Sometimes water from natural stream-flow is too abundant for those who use it, and sometimes there is not enough. So reservoirs are constructed to catch and store stream-flow for release as needed downstream.

Some of our best dams in small streams are made by beavers. They build dams of sticks and mud to form natural reservoirs. Where there are beavers we usually have few floods. Beavers are excellent "water-savers."

The fine soil carried away in erosion and floods fills up reservoirs with *silt,* making them useless. It is then usually necessary to construct a new dam, at a cost which may run to millions of dollars.

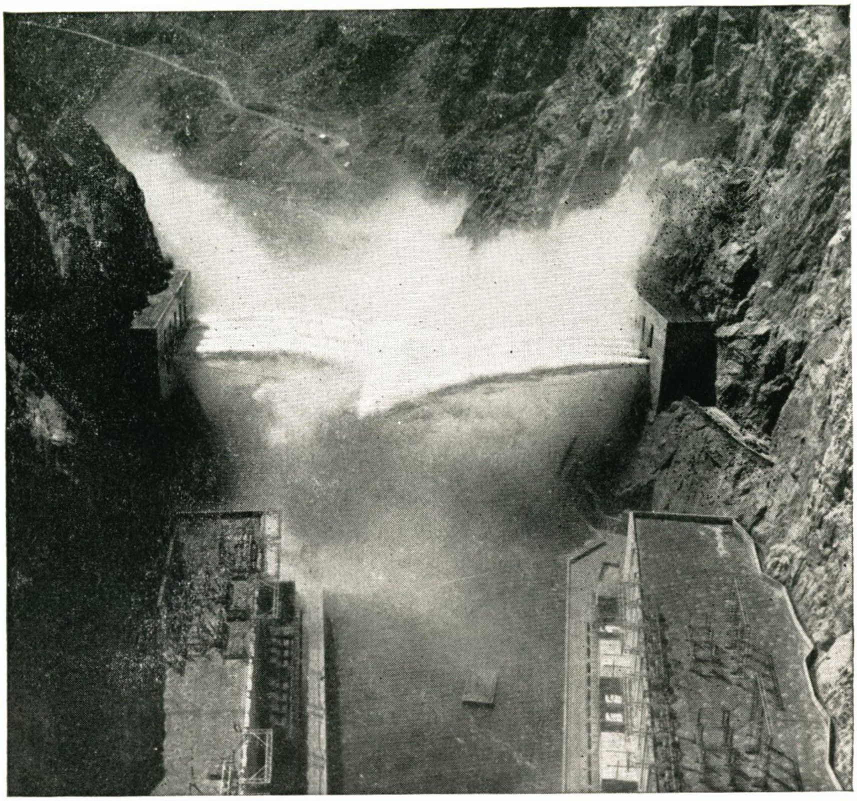


F-417101

This shows a reservoir filled with silt—the tiny soil particles washed away from upstream lands.

In recent years destructive floods of the Mississippi and Ohio Rivers have occurred frequently largely because much of the forest on the headwaters has been destroyed. The pioneers cut and burned the woods to clear the land for their homes and farms. As population increased, the forests were pushed farther back. This and other changes on the land paved the way for floods.

Engineering works such as dams, levees, and concrete-lined channels are usually necessary downstream in bad flood areas. Great flood control projects in California have been constructed in and near Los Angeles and in the lower Sacramento River Valley. Upstream it is necessary to keep out fire, keep down disease and insect damage, and see that use is proper, in order to protect the forest. As long as the forest is there, it will help to store and control water. But the forest can only do its best work when the soil of the forest has been kept in proper condition. Sometimes trees and shrubs are planted and grass is sown to build up the soil cover and slow down the water so that it will not carry away the soil.



F-406286

Hoover Dam on the Colorado River.

The dam shown in the photograph above is an example of a structure which holds back surplus water, thus helping to prevent floods.

Lake Mead, the reservoir behind this dam, furnishes water to generate electricity, and provides recreation for thousands of people. It is one of the sources of power for southern California.

The forest and the soil and the rock are a great reservoir which people living in the valleys may draw upon without cost to themselves except for keeping a good cover of plants on the watershed. Our topsoil has made us a rich and powerful country; but muddy water from our fields and mountains can make us a second-rate power. Already more than half of this Nation's farm lands have been seriously injured by soil erosion. We must learn to use our natural resources wisely. We cannot afford to continue making the same mistakes over and over. We must stop destroying our resources—the only real wealth we have—only to turn around and spend tremendous sums of money to repair the damage—if that is still possible.

FOREST CONSERVATION MEANS—

—Stopping waste from fire.

—Preventing soil erosion on watersheds.

—Reducing waste from careless logging and sawmilling methods.

—Practicing good forestry in removing the timber crop.

—Keeping down losses caused by insects and disease.

—Planting small trees where necessary to help out Mother Nature.

—Provide good living conditions for wild animals, birds, and fish.

KEY WORDS

Humus
Infiltration
Flood control
Silting of a reservoir

PROBLEMS

1. If you have ever seen a flood or damage from a flood, describe it.

2. What is the delta of a river? How is it formed? Why is it fertile?
3. Why does forest soil store large amounts of water while bare soil does not?
4. Find out the extent of damage from silting in your local reservoir. How can it be reduced?
5. Examine some humus or forest soil. Describe it.
6. What is the meaning of forest conservation?

REVIEW

Panel Discussion

Select a panel of five composed of a leader, and four members representing these types of forest users: a sportsman, a building contractor using lumber, a cattle-raiser, and an irrigation farmer. Have a round table discussion on the subject *"What the National Forests of California Mean to Me."*

Test Words

The following are important words—the "keys" to this unit on national forests. They should be clearly understood.

National forest
Topsoil
Soil erosion
Range management
Timber crop
Infiltration
Flood control
Fire prevention
Conservation

APPENDIX

TEACHING AIDS

Following is a brief list which indicates some useful aids. There are excellent bibliographies in the publications.

Selected References

Science in the Elementary School. Prepared and distributed by the California State Department of Education. Pages 168-180 give "desirable outcomes" and references. Has bibliography, teaching ideas.

Science Guide for Elementary Schools. Published by California State Department of Education. Distributed to elementary and junior high schools at time of publication. Pages 281-283 of *Science in the Elementary School,* described above, provide a list of the booklets available in the *Science Guide* series.

Forest Service, U. S. Department of Agriculture, 630 Sansome St., San Francisco 11, Calif., furnishes teaching material on conservation. Maps, charts, posters, many in color, and bulletins. Available free of charge. Ask for sample teacher's packet. Additional copies of *Know Your National Forests* can be obtained from this address.

California's Natural Wealth. 124-page booklet published by California State Department of Education and distributed to public schools in 1940. Illustrated. Good reference material. Appendix pages 119-124 shows sources of information and materials, and lists State and Federal conservation agencies, with their addresses.

Conservation Education in Rural Schools. Published by Department of Rural Education of the National Education Association, 1201 Sixteenth St., N.W., Washington, D. C. Distributed free of charge to all 1943 members. Price 50 cents per copy; discounts up to 33-1/3 per cent for larger quantities. Contains 114 pages of excellent information on teaching conservation in any school system. Objectives; methods; outstanding bibliography of selected, worthwhile helps.

Where Rivers Are Born. Published cooperatively by U. S. Forest Service and State Department of Natural Resources. An illustrated unit on watersheds and the distribution and use of water, written for junior high school. Useful for Women's Clubs and similar organizations. Available upon request from U. S. Forest Service, 630 Sansome

St., San Francisco 11, or Division of Forestry, State Department of Natural Resources, Sacramento.

Recommended Films

All 16mm with sound.

Guardians of the Wild. Produced by Forest Service. 10 minutes. The work of the forest ranger.

There's More Than Timber in Trees. Produced by Forest Service. 35 minutes. Color. Forestry and lumbering from the time of the Pilgrims to the present.

Lifeblood of the Land. Produced by Forest Service, 1947. 18 minutes. Color. The story of water and watersheds. Excellent.

Realm of the Wild. Produced by Forest Service. 18 minutes. Color. Wildlife film. One of the best.

Frying Pan and the Fire. Produced by Forest Service, 1947. 18 minutes. Color. Two girls auto-camping have to put out a forest fire.

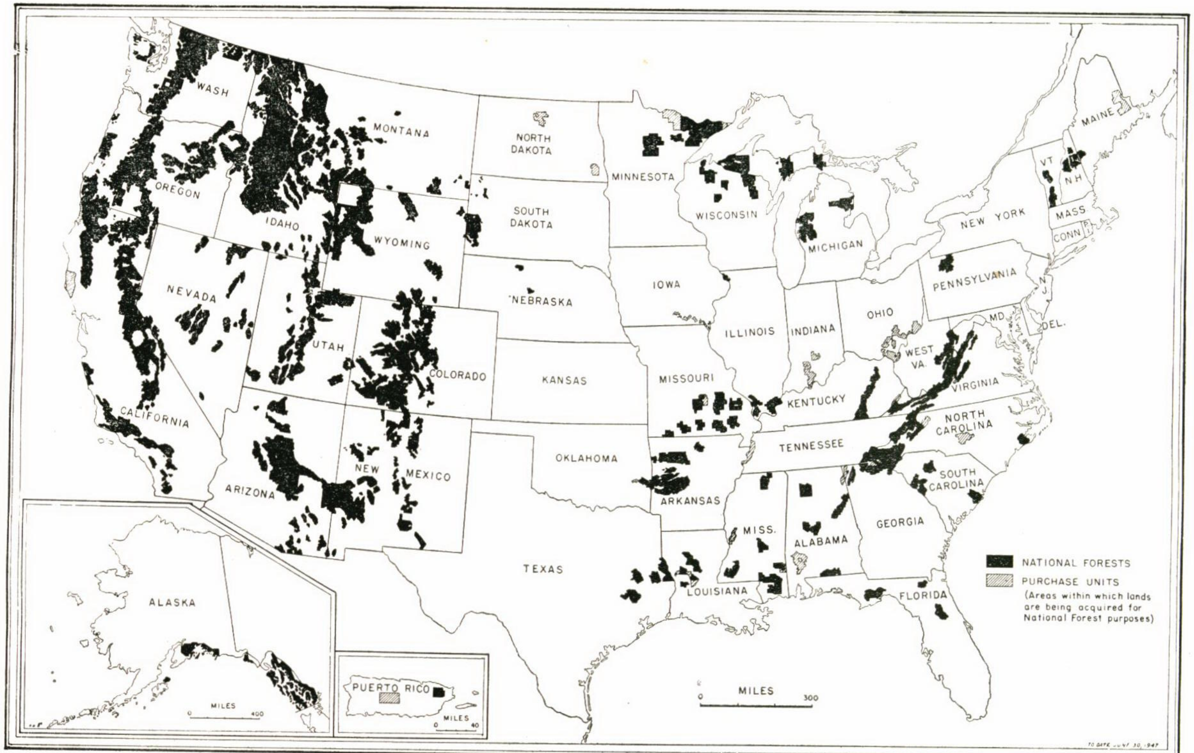
Richer Range Rewards. Produced by Forest Service. 18 minutes. Color. Good range practices increase profits.

Raindrops and Soil Erosion. Produced by Soil Conservation Service. 15 minutes. Color. What the splash of raindrops can do.

If your school library does not have these films, try University Extension Division, University of California, 2441 Bancroft Way, Berkeley; or U. C. L. A., 405 Hilgard Ave., Los Angeles. With advance notice, your nearest Forest Supervisor may be able to supply some of these. See page 4 for addresses. Unless shown by a forest officer, user pays transportation both ways.

Transcription Series

A series of six 15-minute transcriptions for use on 33-1/3 RPM record-players titled *Bill Scott—Forest Ranger.* Teaches forest conservation by dramatization. Can be obtained on loan for short periods from your nearest Forest Supervisor (addresses on page 4) or by writing Forest Service, 630 Sansome Street, San Francisco 11, California. Pupils' study sheets for each program, and announcement posters, are available. Youngsters are the principal characters in these adventures. Evaluated as suitable for grades five to eight inclusive. Approved by State Department of Education. User pays transportation both ways.


WASH
MONTANA
NORTH DAKOTA
MINNESOTA
MAINE
OREGON
IDAHO
WYOMING
SOUTH DAKOTA
WISCONSIN
MICHIGAN
VT
N H
NEW YORK
MASS
CONN
R I
PENNSYLVANIA
N. J.
NEVADA
NEBRASKA
IOWA
ILLINOIS
INDIANA
OHIO
MD
DEL.
UTAH
COLORADO
KANSAS
MISSOURI
WEST VA.
VIRGINIA
KENTUCKY
CALIFORNIA
NORTH CAROLINA
TENNESSEE
OKLAHOMA
NEW MEXICO
ARIZONA
ARKANSAS
SOUTH CAROLINA
MISS.
ALABAMA
GEORGIA
TEXAS
LOUISIANA
FLORIDA
ALASKA
MILES 0 400
PUERTO RICO
MILES 0 40
MILES 0 300
▪ NATIONAL FORESTS
▨ PURCHASE UNITS
(Areas within which lands are being acquired for National Forest purposes)
TO DATE JUNE 30, 1947

NATIONAL FORESTS OF THE UNITED STATES

IMPORTANT TREES OF CALIFORNIA

Commercially important

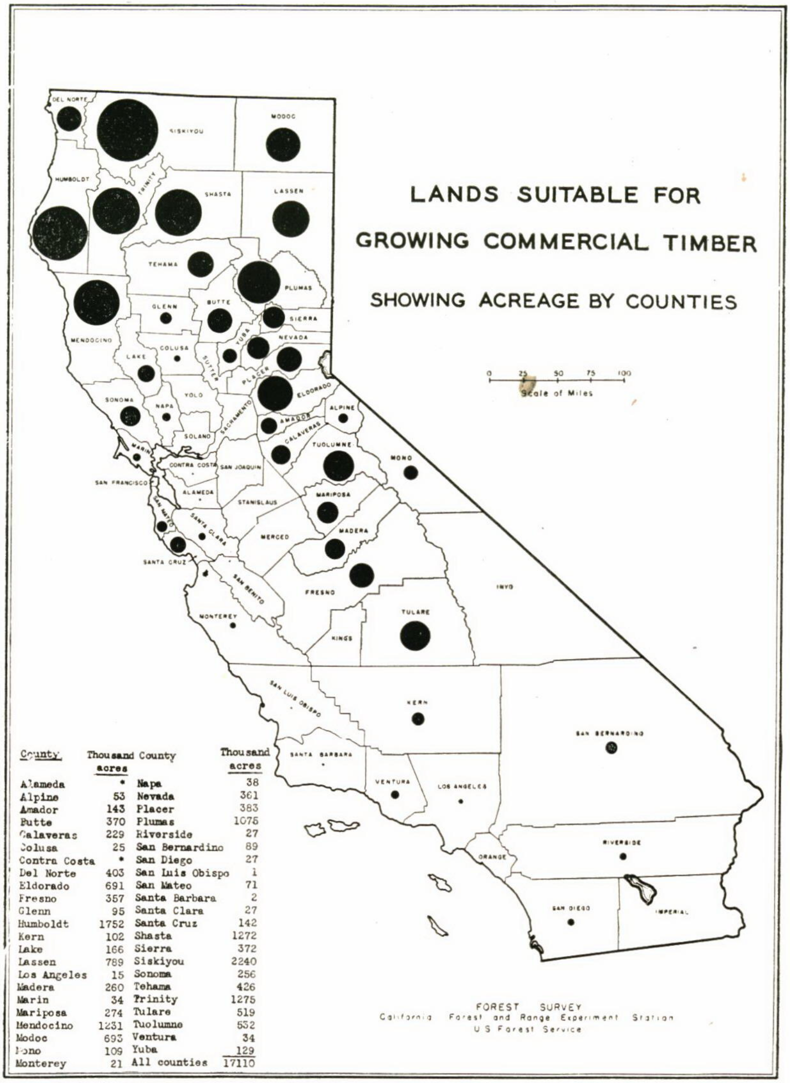
- Ponderosa pine (Pinus ponderosa)
- Redwood (Sequoia sempervirens)
- Douglas-fir (Pseudotsuga taxifolia)
- White fir (Abies concolor)
- California red fir (Abies magnifica)
- Sugar pine (Pinus lambertiana)
- California Incense-cedar (Libocedrus decurrens)
- Sitka spruce (Picea sitchensis)
- Port Orford white-cedar (Chamaecyparis lawsoniana)
- Western white pine (Pinus monticola)
- Monterey pine (Pinus radiata)
- Giant sequoia (Sequoia gigantea)

Wide distribution

- Red alder (Alnus rubra)
- Pacific madrone (Arbutus menziesii)
- Fremont cottonwood (Populus fremontii)
- California black oak (Quercus kelloggii)
- California scrub oak (Quercus dumosa)
- Canyon live oak (Quercus chrysolepis)
- California live oak (Quercus agrifolia)
- Digger pine (Pinus sabiniana)
- Lodgepole pine (Pinus contorta murrayana)

Others of interest

- Quaking aspen (Populus tremuloides)
- Joshua-tree (Yucca brevifolia)
- Bigleaf maple (Acer macrophyllum)
- Monterey cypress (Cupressus macrocarpa)


DEL NORTE
SISKIYOU
MODOC
HUMBOLDT
TRINITY
SHASTA
LASSEN
TEHAMA
PLUMAS
GLENN
BUTTE
SIERRA
MENDOCINO
COLUSA
YUBA
NEVADA
LAKE
SUTTER
PLACER
YOLO
ELDORADO
SONOMA
NAPA
SACRAMENTO
ALPINE
AMADOR
SOLANO
CALAVERAS
MARIN
TUOLUMNE
MONO
CONTRA COSTA
SAN JOAQUIN
SAN FRANCISCO
ALAMEDA
MARIPOSA
STANISLAUS
SAN MATEO
SANTA CLARA
MADERA
MERCED
SANTA CRUZ
SAN BENITO
FRESNO
INYO
MONTEREY
TULARE
KINGS
SAN LUIS OBISPO
KERN
SAN BERNARDINO
SANTA BARBARA
VENTURA
LOS ANGELES
ORANGE
RIVERSIDE
SAN DIEGO
IMPERIAL
0 25 50 75 100
Scale of Miles

LANDS SUITABLE FOR GROWING COMMERCIAL TIMBER

SHOWING ACREAGE BY COUNTIES

County	Thousand acres	County	Thousand acres
Alameda	*	Napa	38
Alpine	53	Nevada	361
Amador	143	Placer	383
Butte	370	Plumas	1075
Calaveras	229	Riverside	27
Colusa	25	San Bernardino	89
Contra Costa	*	San Diego	27
Del Norte	403	San Luis Obispo	1
Eldorado	691	San Mateo	71
Fresno	357	Santa Barbara	2
Glenn	95	Santa Clara	27
Humboldt	1752	Santa Cruz	142
Kern	102	Shasta	1272
Lake	166	Sierra	372
Lassen	789	Siskiyou	2240
Los Angeles	15	Sonoma	256
Madera	260	Tehama	426
Marin	34	Trinity	1275
Mariposa	274	Tulare	519
Mendocino	1231	Tuolumne	532
Modoc	693	Ventura	34
Mono	109	Yuba	129
Monterey	21	All counties	17110

FOREST SURVEY
California Forest and Range Experiment Station
U S Forest Service

FEDERAL AND STATE CUSTODIANS OF FORESTS AND PARKS IN CALIFORNIA

FEDERAL

Forest Service Department of Agriculture	**National Park Service** Department of the Interior
18 National Forests	4 National Parks 8 National Monuments
19¼ million acres	1¾ million acres
Administers national forests for production of timber and forage. Water, fish and wildlife, and recreation are managed for the public benefit. Timber is sold, and cattle and sheep are allowed to graze the forage crop.	Administers national parks and monuments of scenic beauty, historic value, and scientific interest for the enjoyment of visitors. Manages fish, wildlife and water production for public benefit. Timber cutting or grazing not permitted.

STATE

Department of Natural Resources

Division of Forestry	**Division of Beaches and Parks**
6 Forestry districts	88 State Parks, Beaches and Monuments
60,000 acres of State Forest (24 million acres of privately-owned land protected)	500,000 acres
Protects privately-owned and county forest land from fire, and from damage by insects and disease. Administers State Forests. Administers Forest Practices Law of 1945 which provides that the logging industry regulate itself for protection, reforestation, and proper cutting.	Administers 88 parks, beaches, and monuments of scenic beauty, historic value or scientific interest for the enjoyment of the public. These lands are owned by the State. Many of them were originally purchased by the State paying half, with local governments, organizations, or individuals paying the other half.

WILDERNESS AREAS

See page 4 for location of National Forests

Wilderness Area	National Forest
Agua Tibia	Cleveland
Caribou Peak	Lassen
Cucamonga	San Bernardino
Desolation Valley	Eldorado
Devil Canyon - Bear Canyon	Angeles
Emigrant Basin	Stanislaus
High Sierra	Inyo, Sierra
Marble Mountains	Klamath
Middle Eel-Yolla Bolly	Mendocino, Trinity
Mount Dana-Minarets	Sierra
Salmon-Trinity Alps	Klamath, Shasta, Trinity
San Gorgonio	San Bernardino
San Jacinto	San Bernardino
San Rafael	Los Padres
South Warner	Modoc
Thousand Lake Valley	Lassen
Ventana	Los Padres

(OAKLAND—6-23-48—25,000)

U.S. Forest Service
Pacific Southwest Library and Information Center
1323 Club Drive
Vallejo, CA 94592-1110